



NOVA

University of Newcastle Research Online

nova.newcastle.edu.au

Simon; "The Koli Calling community". Published in 16th Koli Calling International Conference on Computing Education Research (Koli, Finland 24-27 November, 2016) p. 101-109 (2016)

Available from: <http://dx.doi.org/10.1145/2999541.2999562>

Accessed from: <http://hdl.handle.net/1959.13/1343485>

The Koli Calling Community

Simon

University of Newcastle
Australia

simon@newcastle.edu.au

ABSTRACT

The Koli Calling conference was first held in 2001 as a local conference in Finland. Since then it has grown into an international conference, yet has successfully maintained the community feeling that has always pervaded it. This bibliometric study examines the Koli Calling proceedings for the past 15 years to try to determine an empirical basis for this community. Which authors keep coming back to Koli, ensuring continuity, and how many papers have they contributed? What is the rate of entry of new authors, ensuring that the community is refreshed and reinvigorated? What is the extent of collaboration between authors, and indeed between countries? The community is found to have a solid core of continuing authors, but still to have room for the entry of new authors, either as co-authors with established community members or alone or with other new authors. The community of Koli authors is found to have a clear Finnish core and yet to be truly international, with strong collaboration both within and between countries. Finally, its pattern of author productivity fits well with Lotka's law, an accepted model of author distribution within a discipline.

CCS Concepts

• **Social and professional topics~Computing education**

Keywords

Bibliometrics; author productivity; computing education.

1. INTRODUCTION

Koli Calling started life as a conference for computing educators from Finland and its neighbouring countries [22], but gradually became more international [5, 14], owing partly to its designation of English as the language in which it would be conducted. Koli Calling is a computing education conference that is renowned for its intimate atmosphere and its sense of community, features that it has retained throughout its 15-year history.

For a conference to establish and maintain a sense of community it must actually have an underlying community, and it is that

community that this paper sets out to define and describe. Who are the people that form the Koli Calling community, how do they contribute to that community, and from what countries do they come? These are the questions that this paper will answer.

The work presented here is a form of bibliometric study, a mathematical or statistical study of publications and their authors. It is a form of meta-research: research not into computing education but into computing education publications. Bibliometrics is an aspect of library science [13] that has previously been applied to a number of discipline-specific areas such as engineering education [24, 25], science education [23], and computing education [7-9, 16-20]. In particular, the author of this paper has recently published a similar bibliometric analysis of ICER, the International Computing Education Research Conference [19]. Bibliometric analysis has much in common with genealogical research – it helps us to understand who we are ('we' in this case being the Koli Calling community) and where we have come from.

2. A BRIEF HISTORY OF KOLI CALLING

In 2001 Professor Erkki Sutinen of the University of Joensuu launched the Koli Calling computing education conference "to attract interested scholars and educational technologists within the universities both in Finland and in the Baltic Sea and Nordic countries" [22]. The conference went well, and it was decided to make it an annual event. Sutinen chaired the conference for three years, but could not continue in this role for ever, so in 2004 the chair was taken by Professor Lauri Malmi of Helsinki University of Technology. However, the conference venue, the resort in the Koli National Park close to Joensuu, had already become an integral part of the atmosphere, and was therefore retained. The conference has been held at Koli every year except 2012, when it was moved to Tahko because the Koli hotel was closed for renovations.

The conference name has changed several times, from the Finnish/ Baltic Sea Conference on Computer Science Education, to the Baltic Sea Conference on Computer Science Education, to the International Conference on Computing Education Research. The last of these names appears to have been in use since 2008, although some volumes of the proceedings show minor variations. However, the familiar name has always been Koli Calling. This is a loose translation of the Finnish Kolin Kolistelut, or Koli Clanking, which was intended to convey the impression of rattling things around and making a noise that would be heard.

For the first seven years each conference was chaired by a single person. From 2008 there have been two chairs each year, and since 2011 each chair has served for two years, once as the new chair and once as the senior chair. These details are summarised in table 1, along with the number of papers published each year.

Table 1: Summary of the first 15 offerings of Koli Calling

Year	Program chairs	Papers
2001	Erkki Sutinen	14
2002	Erkki Sutinen	17
2003	Erkki Sutinen	15
2004	Lauri Malmi	25
2005	Tapio Salakoski	31
2006	Anders Berglund	26
2007	Raymond Lister	31
2008	Arnold Pears, Lauri Malmi	22
2009	Arnold Pears, Carsten Schulte	21
2010	Carsten Schulte, Jarkko Suhonen	23
2011	Ari Korhonen, Robert McCartney	24
2012	Robert McCartney, Mikko-Jussi Laakso	28
2013	Mikko-Jussi Laakso, Simon	29
2014	Simon, Päivi Kinnunen	24
2015	Päivi Kinnunen, Judy Sheard	31

The types of paper presented at the conference are in constant flux. For example, in the first year there were simply papers, whereas in the second year there were a keynote, an invited seminar, papers, and demonstrations. A track for systems papers has been a feature of a number of offerings of the conference. Most recently, in 2015, there were a keynote, full papers, short papers, posters, and doctoral consortium abstracts.

The program committee has grown steadily from six members in 2001 to 33 in 2015. All six original members were from Finland; now well over half of the program committee are from other countries.

The forewords to the conference proceedings serve as a historical record of the growing international nature of the conference, and also of its intimate atmosphere.

2004: “In Finland the conference has already acquired a well-established position as a meeting point for CS educators and researchers of CS education. However, the conference is gaining more international visibility, and this year we had 37 participants from 7 countries.” [5]

2006: “The success of the conference is to a large degree due to the open and friendly atmosphere that encourages the participants to return to this Finnish site. Many of the around 40 participants from nine countries on three continents had attended the conference during earlier years.” [2]

2008: “Without an active community of researchers doing quality research and writing papers, a conference like Koli has no function or purpose. Consequently, a large part of the success of Koli Calling lies in its vibrant research community.” [6]

2009: “Once again the unique atmosphere of the Koli Nature Park and the unique conference it hosts for Computing Educators each year has gathered researchers from many

corners of the globe for stimulating discussions and presentations.” [12]

2014: “Since [2001] the conference has prospered and grown: each year now one of the co-chairs is from Finland and one from another country; half of the program committee are from outside Finland; and typically about half of the submissions come from beyond that original cluster of countries ... Koli Calling is a true international conference in computing education, and yet it retains the intimate atmosphere with which it began. The conference presentations form a single stream; the conference venue is also the accommodation venue; and the social program includes sauna, spa, and an afternoon walk in the surrounding national park.” [21]

Koli Calling is clearly a remarkable conference, sustained by a committed community from Finland and from elsewhere; this paper will present a picture of that community.

3. PAPERS AND COUNTRIES OF ORIGIN

In the 15 years since Koli Calling was first held, the conference has published 361 papers of various types. Other bibliometric analysis in computing education [7-9, 16-20] has focused on full papers accepted after peer review. However, this project, with its goal of exploring the community, will consider all of the publications listed in the proceedings, including keynote addresses and posters, because the authors of these publications are clearly members of the community.

Having always been held in Finland, can the conference truly claim to be international? The following analysis is intended to determine whether the claim is substantiated.

Some papers clearly come from a single country, because all of their authors come from that same country. Any other paper, with authors from different countries, can be called multinational. Koli Calling has given rise to 48 multinational papers over its 15 years: 34 have authors from two countries; 10 have authors from three countries; three have authors from four countries; and one has authors from six countries.

How does one count a country’s share of a multinational paper? Larsen [4] lists five distinct ways in which this has been done, noting that they are not all of equal merit. We shall illustrate the approaches and their differences with reference to a paper from Koli Calling 2012 that lists eight authors: two from Germany, one from the UK, two from Lithuania, and three from Sweden [15].

In *straight counting*, a count of 1 is given to the country of a paper’s first author. With straight counting, our example paper would count 1 for Germany and nothing for the other countries. The system ignores all authors but the first, giving no particular recognition to multinational papers.

In *complete counting*, a count of 1 is given to a country each time it appears in the author list. With complete counting, our example paper would count 2 for Germany, 1 for the UK, 2 for Lithuania, and 3 for Sweden.

In *whole counting*, a count of 1 is given to each *distinct* country in the author list. With whole counting, our example paper would count 1 for Germany, 1 for the UK, 1 for Lithuania, and 1 for Sweden.

The disadvantage of both whole and complete counting is that the total of the counts bears no relation to the number of papers. For example, complete counting counts the total number of entries in the author lists of all papers combined. The following two methods overcome this disadvantage, and are therefore arguably preferable.

In *complete-normalised* counting, a paper is given a count of 1, which is divided by the number of authors, and each author's portion is added to the count for that author's country. With this method, our example paper would count 0.25 for Germany, 0.125 for the UK, 0.25 for Lithuania, and 0.375 for Sweden.

In *whole-normalised* counting, a paper is given a count of 1, which is divided by the number of distinct countries in the author list, each country being awarded an equal share. With this method, our example paper would count 0.25 for Germany, 0.25 for the UK, 0.25 for Lithuania, and 0.25 for Sweden.

With both of the normalised methods, the sum of the counts should be the same as the number of papers, because each paper has a count of 1. The difference lies in whether the focus is on the number of countries represented or the number of authors represented from each country. This analysis will use whole-normalised counting, because its interest is in the number of countries represented in each paper.

Table 2 shows the number of papers from each country according to whole-normalised counting. More than half of the papers come from Finland, far more than from any other country. Germany is a distant second, followed by Sweden, UK, Australia, and USA, in a fairly close group. Spain stands alone in the next position, and the remaining 23 countries range from 5.6 papers to 0.2 papers.

A country's contribution to Koli Calling would be influenced by many competing factors, such as the level of interest in computing education publications, the proportion of academics who speak and write English, travel time and distance to the conference venue, and the availability of funding for travel to conferences. These factors are not easy to measure and compare, but one that is relatively easy is the population of each country. Table 3 displays the same whole-normalised paper counts, but ranked by the

Table 2: Number of papers from each country (rounding errors from fractional papers are significant)

Finland	189.9	Israel	1.5
Germany	35.6	Japan	1.5
Sweden	22.2	Estonia	1.0
UK	20.7	Greece	1.0
Australia	19.1	Philippines	1.0
USA	18.6	Slovenia	1.0
Spain	10.5	South Africa	1.0
New Zealand	5.6	Switzerland	1.0
Denmark	5.5	Tanzania	1.0
Portugal	5.0	Czech Republic	0.5
Canada	4.2	Italy	0.5
Netherlands	4.0	Poland	0.5
Lithuania	3.5	Turkey	0.5
China	2.8	Norway	0.3
Russia	2.0	Ireland	0.2

number of Koli papers per hundred thousand of population.

Finland has an even greater lead by this criterion, with Sweden moving into clear second place, and New Zealand and Lithuania well ahead of the remaining countries.

It is clear from both of these measures that Koli Calling is very much a Finnish conference. Yet at the same time it has a clear international aspect, with 29 other countries together contributing nearly half of the whole-normalised paper count.

4. AUTHORS AND CONTRIBUTIONS

The 361 papers together have a total of 894 authors. Intriguingly, the tables of contents of the proceedings together list 895 authors, but one of those authors was not listed on the paper itself, presumably having withdrawn from it before publication. The total number of authors, as listed on the papers, is by no means the same as the number of distinct authors: many authors contribute to multiple papers and therefore appear multiple times on the list. To accommodate this distinction we define an *author contribution* as one author's contribution to one paper. Koli Calling therefore has a total of 894 author contributions; averaged

Table 3: Papers per hundred thousand of population

Country	Papers	Pop (million)	Papers/100K
Finland	189.9	5.5	345.3
Sweden	22.2	9.9	22.4
New Zealand	5.6	4.6	12.1
Lithuania	3.5	2.9	12.1
Denmark	5.5	5.7	9.6
Australia	19.1	24.3	7.9
Estonia	1.0	1.3	7.7
Portugal	5.0	10.3	4.9
Slovenia	1.0	2.1	4.8
Germany	35.6	80.7	4.4
UK	20.7	65.1	3.2
Netherlands	4.0	17.0	2.4
Spain	10.5	46.1	2.3
Israel	1.5	8.2	1.8
Switzerland	1.0	8.4	1.2
Canada	4.2	36.3	1.1
Greece	1.0	10.9	0.9
Norway	0.3	5.3	0.6
USA	18.6	324.1	0.6
Czech Republic	0.5	10.6	0.5
Ireland	0.2	4.7	0.4
South Africa	1.0	55.0	0.2
Tanzania	1.0	55.2	0.2
Russia	2.0	143.4	0.1
Poland	0.5	38.6	0.1
Japan	1.5	126.3	0.1
Philippines	1.0	102.3	0.1
Italy	0.5	59.8	0.1
Turkey	0.5	79.6	0.1
China	2.8	1382.3	0.02

over the 361 papers, this gives a mean of about 2.5 authors per paper, suggesting that there have been many multi-author papers.

Counting the distinct authors poses the problem of linking names to people. In the early years of the conference many authors were identified only by initial and surname, leaving open the possibility of conflating two or more authors into a single person. In addition, authors can change their names between papers, or can use different forms of the same name. Trivial examples would be Michael Caspersen and Michael E Caspersen, or Nickolas Falkner and Nickolas JG Falkner; somewhat less trivial, Mikko-Jussi Laakso and Mikko Laakso; not at all trivial, Essi Lahtinen and Essi Isohanni, or L Grandell, Linda Grandell, and Linda Mannila. Therefore while text comparison of author names is an essential first step, one must consider additional information such as the authors' institutions, email addresses, and collaborators. Applying these techniques, the 894 author contributions appear to represent 443 distinct authors, giving an average of two papers per author. The remainder of this section will examine the contributions made by some of these authors to the Koli Calling community.

4.1 High number of conferences

A community can generally expect to have some members who have belonged for a considerable time. In the context of Koli Calling, that would suggest authors who have had papers at many instances of the conference. No author has had a paper at every year of Koli Calling. Lauri Malmi has had papers at 12 of the 15, Ari Korhonen at 10, and Tapio Salakoski at nine. As shown in table 4, there are 42 authors who have had papers at four or more Koli Calling conferences. This would certainly seem to provide evidence of a community with continuity.

Table 4: authors with papers accepted at specified number of Koli Calling conferences

Kolis	Authors	Names
12	1	Lauri Malmi
10	1	Ari Korhonen
9	1	Tapio Salakoski
8	7	Petri Ihtantola, Ilkka Jormanainen, Ville Karavirta, Päivi Kinnunen, Arnold Pears, Simon, Erkki Sutinen
7	4	Anna Eckerdal, Essi Lahtinen/Isohanni, Otto Seppälä, Juha Sorva
6	5	Anders Berglund, Mikko-Jussi Laakso, Jan Lönnberg, Robert McCartney, Carsten Schulte
5	13	Tuukka Ahoniemi, Roman Bednarik, Jouni Ikonen, Ville Isomöttönen, Hannu-Matti Järvinen, Maria Knobelsdorf, Andrés Moreno, Jan Erik Moström, Mia Peltomäki, Kate Sanders, Judy Sheard, Teemu Sirkiä, Neena Thota
4	10	Meurig Beynon, Juha Helminen, Erkki Kaila, Linda Grandell/Mannila, Niko Myller, Jari Porras, Teemu Rajala, Jarkko Suhonen, Matti Tedre, Mikko Vesisenaho
3	29	...
2	62	...
1	311	...

4.2 High number of papers

Which authors have had most papers published at Koli? This is not necessarily the same as the list in table 4. An author with just one paper at the conference every year would not amass as many publications as one with two or three papers in each of seven or eight years. Both Anders Berglund and Peter Hubwieser have co-authored five papers at a single Koli Calling; Essi Isohanni (formerly Essi Lahtinen) and Lauri Malmi have each had four papers in a single year; and there are 14 authors who have authored three papers in a single year.

An author's contribution to a paper can be quantified in much the same ways as a country's contribution, as explained in section 3. *Complete counting* entails giving a count of 1 to each author of a paper. If a paper has five authors, each of the five will be given a count of 1, and the paper will register five contributions. On the other hand, *complete-normalised counting* entails giving the paper itself a count of 1, which is then divided equally among the authors. If a paper has five authors, each of the five will be given a count of 0.2. It should be noted that when counting authors, there is no difference between complete-normalised counting and whole-normalised counting, as no author will be listed twice on the same paper.

When counting authors' papers there is some merit in complete counting, because it answers the question 'how many papers has author x had at this conference'? On the other hand, complete-normalised counting recognises the shared load of a joint paper by distributing its credit among its authors. But by the same token it gives the highest credit to authors who work alone, and might thus be seen as discouraging collaboration. The importance of collaboration in computing education research has been pointed

Table 5: High-contributing authors ranked by complete count (CC), also showing complete-normalised count (CNC) and rank according to CNC

CC	Author	Country	CNC	CNC rank
23	Lauri Malmi	Finland	7.8	1
14	Ari Korhonen	Finland	4.3	9
	Tapio Salakoski	Finland	4.1	13
12	Essi Lahtinen/Isohanni	Finland	5.0	5
	Päivi Kinnunen	Finland	4.3	10
11	Erkki Sutinen	Finland		
10	Anders Berglund	Sweden	5.0	4
	Anna Eckerdal	Sweden	1.8	46
	Robert McCartney	USA	2.5	27
	Carsten Schulte	Germany	5.0	3
	Juha Sorva	Finland	6.7	2
9	Petri Ihtantola	Finland	4.1	12
	Ilkka Jormanainen	Finland	3.8	15
	Ville Karavirta	Finland	2.8	23
8	Mikko-Jussi Laakso	Finland	1.8	49
	Arnold Pears	Sweden	2.5	28
	Simon	Australia	4.6	6
7	Tuukka Ahoniemi	Finland	3.3	18
	Roman Bednarik	Finland	2.3	32
	Otto Seppälä	Finland	2.8	25
	Teemu Sirkiä	Finland	4.5	8
	Matti Tedre	Finland/Sweden	3.3	20

out: broader collaboration “might indicate a greater engagement with the computing education community, and will often give more confidence in the generalisability of results” [16]. For these reasons, the analysis in this paper will focus on complete counting, but will also consider authors’ complete-normalised counts.

As shown in table 5, 22 authors have contributed seven or more papers to Koli Calling. With 23 papers, Lauri Malmi from Finland has a lead that appears almost unassailable in the foreseeable future.

The fourth and fifth columns of table 5 show the complete-normalised counts of these high-contributing authors and their ranks according to that count. Not surprisingly given the extent of his CC lead, Lauri Malmi is also ranked first by CNC. However, the remaining CNC ranks bear only a passing resemblance to the CC ranks. Juha Sorva, equal seventh by CC, ranks second by CNC because his 10 papers were shared among fewer co-authors than, say, Ari Korhonen’s 14 papers. On the other hand, Anna Eckerdal, also equal seventh by CC, ranks 46th by CNC because her papers have been shared with so many co-authors. Further inspection of the rightmost column of table 5 will show many other such differences. As observed by Larsen [4], “there can be substantial differences in scores obtained by different counting methods and therefore in rankings and calculation of shares”.

It is clear that each of these counting systems tells us something quite different. The complete count simply indicates how many papers an author has (co-)authored. On the other hand, the complete-normalised count tempers that number according to the number of co-authors on each paper, in an attempt to assess each author’s contribution. However, a high ranking by either system is clearly a noteworthy achievement.

4.3 Overall number of papers

While it is important to recognise a community’s most productive members, there is another measure of author productivity that takes the whole population into consideration. Lotka’s law of author productivity [10] encapsulates observations about how many authors contribute just one paper within a discipline, how many contribute two, and so on. Specifically, given a total pool of

A authors, the number of authors A_n contributing to n papers will be CA/n^p , where C and p are constants that vary according to the discipline but are generally expected to be close to 60% and 2 respectively. Nicholls [10] used multiple data sets to validate Lotka’s law, but concluded that C is more likely to be found in the range of 71% to 81%, and p in the range of 2.35 to 2.85. While this is not formally correct, C is often estimated from the case where $n=1$, that is, the proportion of authors contributing to just one paper; for Koli Calling this estimate gives a value of 67.1%, quite close to Lotka’s suggested 60% and clearly below the range established by Nicholls. This means that the proportion of authors contributing just one paper to Koli Calling, while somewhat higher than estimated by Lotka, is lower than subsequently determined by Nicholls: Koli Calling tends to draw authors back at a greater rate than expected.

Table 6 shows the observed numbers of authors contributing to specified numbers of papers, alongside the numbers predicted by Lotka’s law with the power constant p set at 2.2 to give a reasonable match with the observed counts for two, three, and four contributions. The table suggests that author productivity at Koli Calling is a good fit to the power law derived from Lotka for a sufficiently large list of published papers within a discipline. The fifteen years of Koli Calling appear to constitute a sufficiently large list of published papers, and the Koli community displays the productivity characteristics of a research discipline. This is not assured among computing education conferences: analysis of the ITiCSE conference [18] produces a very different result, with 79.5% of authors contributing to just one paper each.

4.4 Introduction of new authors

In the first year of a conference all of the authors are new to that conference. What happens in the subsequent years affects the extent to which that conference can be considered a community. If the same authors continue to dominate the conference year after year, they would be very much a closed community. On the other hand, a completely fresh batch of authors each year would remove the continuity that a community requires. The ideal would therefore be a suitable mix of continuing and new authors.

A new author can join a conference community in one of two ways. One way is for the author to write a paper alone or with

Table 6: Observed and predicted numbers of authors contributing to specified numbers of papers, using Lotka’s law with $C=67.1\%$ and $p=2.2$

Contributions	Authors Observed	Authors Predicted
1	298	298
2	61	65
3	31	27
4	14	14
5	7	9
6	11	6
7	5	4
8	3	3
9	3	2
10	5	2
11	1	2
12	2	1
13	0	1
14	2	1
...	0	1/0
23	1	0

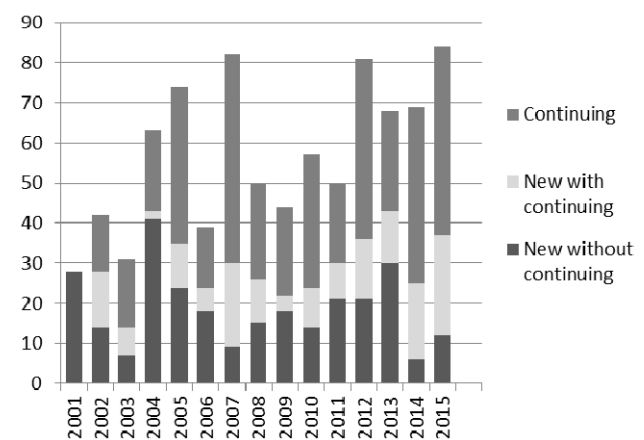


Figure 1: Counts of continuing authors and of new authors with and without continuing authors

other new authors; when this happens it shows that the community is open to newcomers. The other way is for the new author to join one or more continuing authors as a co-author of a paper; when this happens the new author can be considered to have joined the community by invitation from the continuing authors. A good publishing community will accept reasonable numbers of new authors by each of these approaches.

Figure 1 shows the author counts for each year of the conference, partitioned into three groups: continuing authors, new authors who have co-authored with continuing authors, and new authors who have not co-authored with continuing authors.

The figure shows that while the continuing authors dominate, they are joined each year by reasonable numbers of new authors. The years 2004 and 2009 saw very few new authors co-authoring with continuing authors, and 2014 and 2015 saw very few new authors unaccompanied by continuing authors; but over the years these numbers even out. The overall picture is of a strong community of continuing authors that welcomes new authors regardless of whether they enter the community by invitation or on their own account.

5. COLLABORATION

Collaboration in academic publishing is generally considered to be worthwhile, and is clearly increasing. One analysis charts the diminishing proportions of single-author papers in scientific research publications [1]. In the context of Koli Calling, collaboration can be seen as evidence for the strength of the community.

The average of 2.5 authors per paper, mentioned at the beginning of section 4, suggests a good deal of collaboration. In this section we shall consider aspects of that collaboration.

A single-author paper shows no evidence of collaboration, although this is not to deny that some collaboration might have taken place. A paper by two or more authors at the same institution gives clear evidence of collaboration. If there are several authors at different institutions, the collaboration is

broader, in that the researchers had to take greater steps to bring it about. And by the same token, multinational contributions suggest collaboration that is broader still.

Figure 2 shows the breakdown of Koli Calling papers according to these levels of collaboration. Single authors make up 29% of the papers. However, nearly twice as many papers are written by multiple authors within a single institution. Nearly a quarter of the papers entail collaboration between institutions, with multinational collaborations making up more than half of that group. There is strong evidence of collaboration, be it within institutions, between institutions in the same country, or between institutions in different countries.

In 2012 Miró Julià et al [9] measured the average number of collaborators per author at six computing education conferences. The averages ranged from 1.59 to 3.11. The average for the fifteen years of Koli Calling is 4.48, well above all of the 2012 measures [9]. This helps to confirm that Koli Calling authors are a highly collaborative group.

5.1 Collaborations of individual authors

In Table 5 we saw some authors who have earned a high complete count by contributing to a large number of papers, but a relatively low complete-normalised count by sharing those papers with many co-authors. This might be because they tend always to work with the same co-authors, following an initial paper with more work and subsequent papers. Alternatively, it might be because they take part in different projects with different groups, thus accumulating more co-authors.

A paper from Koli Calling 2004 had 22 authors from four countries [3]. A paper from Koli Calling 2007 had 14 authors from six countries [11]. Five authors contributed to both of these papers. No other Koli Calling papers have had more than 9 authors, so these two papers will exert a strong influence on any measurements of collaboration at the conference.

It would not make sense to eliminate these papers from the collaboration analysis: they were presented at the conference, and they are clear indications of collaboration. Nevertheless, the 22-author paper created at one stroke 22 authors with 21 collaborators each, and the 14-author paper boosted the collaborator counts of five of those authors to 30. For nine authors of the 22 and three authors of the 14 this was their only Koli Calling paper, so their collaborator counts might be considered disproportionate to their contribution to the community.

Table 7 shows the Koli authors with the greatest numbers of Koli co-authors. However, it marks with bold text the five authors who contributed to both the 22-author paper and the 14-author paper, and with italic text the other authors of the 22-author paper. Readers interested in seeing past the collaborator counts of those papers will find that among the remaining authors, Lauri Malmi, Arnold Pears, Päivi Kinnunen, Tapio Salakoski, Erkki Sutinen, and Anders Berglund show high levels of collaboration – and even then, four of those authors contributed to the 14-author paper. So while it is possible to form a literal picture of the collaboration counts of Koli Calling authors, some readers might consider those counts to be somewhat skewed by the two papers with the greatest numbers of authors.

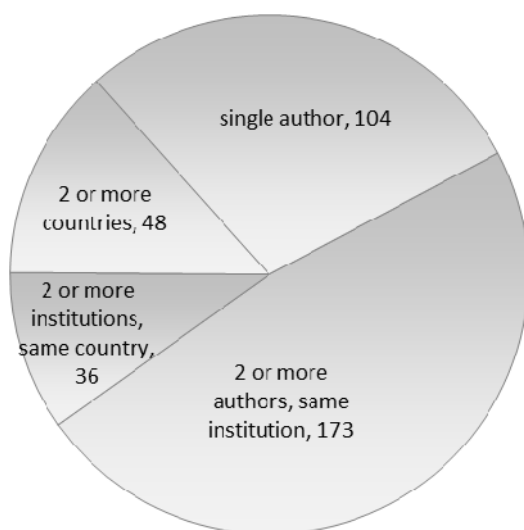


Figure 2: Papers at each level of collaboration

5.2 Collaboration clusters

In 2012, Miró Julià et al [9] examined the papers published at six computing education conferences and a number of other conferences, with the goal of detailing their collaboration networks. Authors who publish together form clusters: if authors A and B write a paper together, they initiate a cluster of two authors; if A then writes another paper with authors C and D, the latter two authors become part of the same cluster; if author C then writes a further paper with authors E, F, and G, all seven of these authors will belong to the same cluster. Miró Julià et al observed that every established collaboration network includes one ‘giant component’ making up a large percentage of its members; in the computing education conferences they found that this giant component ranged from 14% to 46%.

The giant component of Koli Calling is 50%, which lies above the range found for computing education conferences. However, there are 88 distinct clusters, most of them quite small. This means that while half of the authors of Koli Calling are involved in mutual collaboration, the other half tend to work in quite small groups and not to collaborate outside those groups. Of course in some cases this will be because they have not yet spent long enough in the community to start collaborating with continuing members.

Miró Julià et al [9] partition papers into four groups according to their effect on the collaboration network. *Merge* papers, written by authors from two distinct clusters, merge the two into a single cluster. *Extend* papers, written by authors from a single cluster

along with new authors, add new members to the cluster of the existing authors. Merge takes precedence over Extend, so a paper written by existing authors from two or more clusters and additional new authors is classified as a Merge paper. *Internal* papers, written by existing authors who are already in the same cluster, change nothing in the network. *New* papers, written by authors all of whom are new to the network, generate a new cluster.

The analysis of Miró Julià et al [9] includes the proportions of Merge, Extend, Internal, and New papers in the conferences under consideration. Figure 3 shows the ranges that they found for these values over the six computing education conferences. Similar analysis has now been conducted for the present paper: the values for Koli Calling are shown alongside the ranges, marked *Koli*.

The number of Extend papers is unexceptional, lying in the middle of the range. The number of Internal papers is well above the top of the range, telling us that about a third of all Koli Calling papers are written by authors who are already part of the same collaboration cluster. The number of Merge papers is at the high end of the range, indicating a high number of new collaborations between members of hitherto distinct clusters. Given these high values, the number of New papers is necessarily low: with so many papers extending clusters, merging them, or working entirely within them, only a third of the papers remain for entirely new authors. However, this need not be seen as a negative: a conference whose New papers comprise more than 50% of its total is a conference with less continuity, and thus less evidence of community. In this regard, these figures seem to blend well together, supporting the notion of Koli Calling as a community of researchers.

5.3 Collaboration between countries

The predominance of papers from Finland, as shown in tables 2 and 3, leads to a consideration of the extent to which Finnish authors collaborate with authors from other countries at Koli Calling. The answer is shown in figure 4, which illustrates all of

Table 7: Koli authors with 10 or more Koli co-authors; in bold, those who contributed to the 22-author paper and the 14-author paper; in italic, those who contributed to the first of those but not the second

Anna Eckerdal	43
Robert McCartney	36
Lauri Malmi	35
Jan Erik Moström	34
Mark Ratcliffe, Beth Simon	31
Arnold Pears	26
Päivi Kinnunen	24
<i>Anthony Robins, Carsten Schulte, Josh Tenenberg</i>	23
<i>Dennis Bouvier, Tzu-Yi Chen, Tammy VanDeGrift</i>	22
<i>Ken Blaha, Donald Chinn, Stephen Cooper, Alison Elliott Tew, Sally Fincher, Hubert Johnson, Alvaro Monge, Marian Petre, Kris Powers, Dean Sanders, Leslie Schwartzman, Carol Stoker</i>	21
Tapio Salakoski, Erkki Sutinen	18
Anders Berglund	17
Essi Lahtinen/Isohanni, Mikko-Jussi Laakso, Lynda Thomas	16
Ari Korhonen, Neena Thota	14
Philip East, Laurie Murphy, Ioanna Stamouli	13
Ilkka Jormanainen, Otto Seppälä, Judy Sheard, Arto Vihavainen	12
Simon, Jarkko Suhonen	11
Jouni Ikonen, Ville Karavirta, Matti Tedre	10

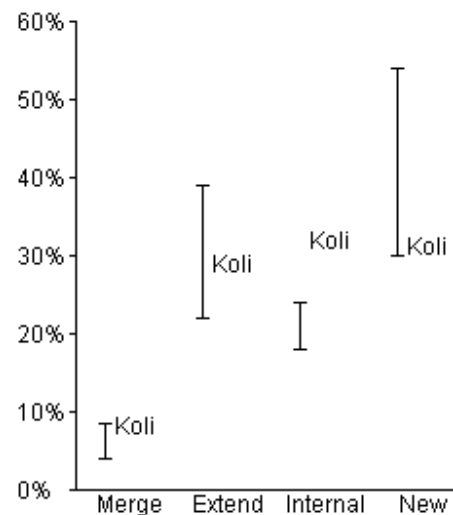


Figure 3: Percentages of Merge, Extend, Internal, and New papers for six computing education conferences [9], and Koli Calling.

the collaboration links between countries.

At the bottom of the figure there are nine countries with no international collaboration: authors from these countries have collaborated only among themselves. The remainder of the figure shows that authors from Finland have collaborated with authors from 16 other countries. Only Lithuania, Poland, Denmark, and Norway have collaborated with other countries but not with Finland. Given Finland's dominance of the papers, it would have been easy for Finnish authors to collaborate only among themselves. Instead they have shown a willingness to work with authors from around the world, greatly adding both to the sense of community and to the international nature of the conference.

6. LOCAL ARRANGEMENTS

Koli Calling is the only computing education conference to have been hosted every year by the same university, formerly the University of Joensuu, which is now part of the University of Eastern Finland (UEF). This made sense for the first three years, when the conference chair came from that university; but when the role of chair moved to other institutions, a sustained contribution was required from UEF in order to locate the conference year after year in the glorious Koli National Park.

It is unfortunate that the conference proceedings do not always explicitly acknowledge the staff and students of UEF who have taken on these local arrangements, which include liaising with the Koli Hotel, arranging transport between Joensuu and the venue, proposing a budget and managing the funds, and many other almost unseen tasks. Ilkka Jormanainen and Jarkko Suhonen appear to have been involved in these tasks almost since the

conference began; in recent years they have been joined by Calkin Suero Montero. There have been many more local helpers, and it is unfortunate that they cannot all be listed on the basis of the conference proceedings. Without these people it would be virtually impossible for somebody from outside Finland to chair the conference. Without these people, the community would not exist. Koli Calling owes them an immense debt of gratitude.

7. DISCUSSION

This analysis illustrates and elucidates the community of computing educators formed around the Koli Calling conference. The conference has clear continuity, with a core of authors who keep returning, and a dedicated local team that facilitates the conference year after year. At the same time, it welcomes new participants, whether they are introduced by continuing authors or arrive with no such introduction.

The community is strongly collaborative, both within and between institutions. While heavily based on Finland, the collaboration has a clear international component.

In terms of author productivity, the community appears to conform well with Lotka's law describing publication patterns within a discipline. Fewer authors than might be expected leave the community after just one contribution, and many authors contribute to high numbers of papers.

In conclusion, Koli Calling is something more than just a collection of authors who happen to publish at the same conference; it is indeed a community of computing education researchers and practitioners. Given its many positive characteristics, it is no surprise that it has flourished in the years since its inception, and it shows promise of continuing to flourish for many years to come.

8. REFERENCES

- [1] HA Abt (2007). The future of single-authored papers. *Scientometrics* 73:3, 353-358.
- [2] A Berglund (2006). Foreword to Sixth Baltic Sea Conference on Computer Science Education (Koli Calling 2006), ii-iii.
- [3] S Fincher, M Petre, J Tenenber, K Blaha, D Bouvier, T-Y Chen, D Chinn, S Cooper, A Eckerdal, H Johnson, R McCartney, A Monge, JE Moström, K Powers, M Ratcliffe, A Robins, D Sanders, L Schwartzman, B Simon, C Stoker, A Elliott Tew, and T VanDeGrift (2004). A multi-national, multi-institutional study of student-generated software designs. Fourth Finnish / Baltic Sea Conference on Computer Science Education (Koli Calling 2004), 20-27.
- [4] PO Larsen (2008). The state of the art in publication counting. *Scientometrics* 77:2, 235-251.
- [5] L Malmi (2004). Foreword to Fourth Finnish / Baltic Sea Conference on Computer Science Education (Koli Calling 2004), iii.
- [6] L Malmi and A Pears (2008). Foreword to Eighth International Conference on Computing Education Research (Koli Calling 2008), 1.
- [7] L Malmi, J Sheard, Simon, R Bednarik, J Helminen, A Korhonen, N Myller, J Sorva, and A Taherkhani (2010). Characterizing research in computing education: a preliminary analysis of the literature. Sixth International

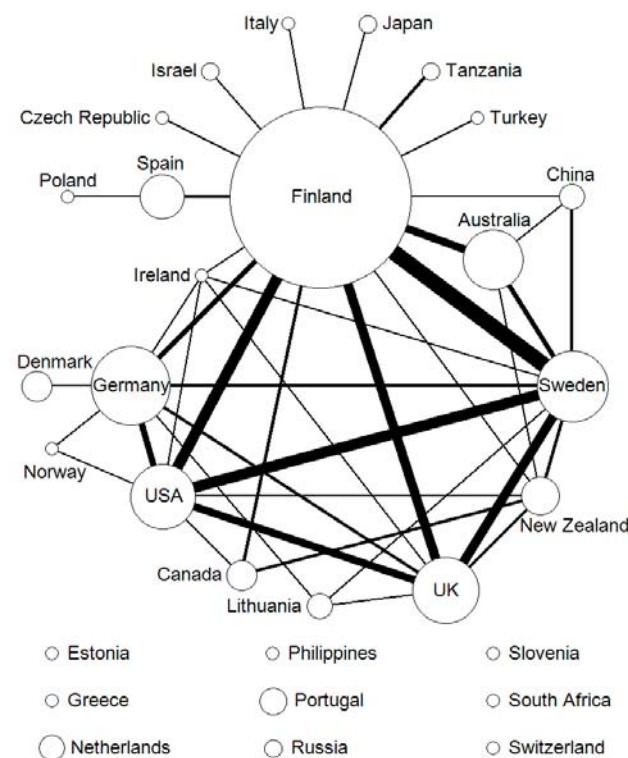


Figure 4: Collaborations between countries, with numbers of papers from each country represented by circle areas

- Computing Education Research Workshop (ICER 2010), 3-11.
- [8] L Malmi, J Sheard, Simon, R Bednarik, J Helminen, A Korhonen, N Myller, J Sorva, and A Taherkhani (2014). Theoretical underpinnings of computing education research – what is the evidence? Tenth International Computing Education Research Conference (ICER 2014), 27-34.
 - [9] J Miró Julià, D López, and R Alberich (2012). Education and research: evidence of a dual life. Eighth International Computing Education Research Workshop (ICER 2012), 17-22.
 - [10] PT Nicholls (1989). Bibliometric modeling processes and the empirical validity of Lotka's law. *Journal of the American Society for Information Science* 40:6, 379-385.
 - [11] A Pears, A Berglund, A Eckerdal, P East, P Kinnunen, L Malmi, R McCartney, JE Moström, L Murphy, MB Ratcliffe, C Schulte, B Simon, I Stamouli, and L Thomas (2007). What's the problem? Teachers' experience of student learning successes and failures. Seventh Baltic Sea Conference on Computing Education Research (Koli Calling 2007), 207-211.
 - [12] A Pears and C Schulte (2009). Foreword to Ninth International Conference on Computing Education Research (Koli Calling 2009), 1.
 - [13] A Pritchard (1969). Statistical bibliography or bibliometrics? *Journal of Documentation* 25:4, 348-349.
 - [14] T Salakoski (2005). Foreword to Fifth Conference on Computer Science Education (Koli Calling 2005), i-ii.
 - [15] C Schulte, M Hornung, S Sentance, V Dagiene, Tatjana Jeksikova, N Thota, A Eckerdal, and A-K Peters (2012). Computer science at school / CS teacher education – Koli working group report on CS at school. 12th International Conference on Computing Education Research (Koli Calling 2012), 29-38.
 - [16] Simon (2007). A classification of recent Australasian computing education publications. *Computer Science Education* 17:3, 155-169.
 - [17] Simon (2008). Koli Calling comes of age: an analysis. Seventh Baltic Sea Conference on Computing Education Research (Koli Calling 2007), Koli National Park, Finland, November 2007. *Conferences in Research and Practice in Information Technology* 88, 119-126.
 - [18] Simon (2015). Emergence of computing education as a research discipline. Doctoral dissertation, Aalto University, Finland.
 - [19] Simon (2016). A picture of the growing ICER community. Twelfth International Computing Education Research Conference (ICER 2016), 153-159.
 - [20] Simon, A Carbone, M de Raadt, M Hamilton, R Lister, and J Sheard (2008). Classifying computing education papers: process and results. Fourth International Computing Education Research Workshop (ICER 2008), 161-171.
 - [21] Simon and P Kinnunen (2014). Foreword to 14th International Conference on Computing Education Research (Koli Calling 2014), ii.
 - [22] E Sutinen (2001). Foreword to First Finnish / Baltic Sea Conference on Computer Science Education (Koli Calling 2001), iii.
 - [23] C-C Tsai and ML Wen (2005). Research and trends in science education from 1998 to 2002: a content analysis of publication in selected journals. *International Journal of Science Education* 27:1, 3-14.
 - [24] P Wankat (2004). Analysis of the first ten years of the *Journal of Engineering Education*. *Journal of Engineering Education* 93:1, 13-21.
 - [25] B Williams and P Neto (2012). Tracking engineering education research and development – contributions from bibliometric analysis. *International Journal of Engineering Pedagogy* 2:2, 37-44.